

Claims

1. A double diffused field effect transistor made in accordance with the method comprising:

- providing a substrate of a first conductivity type;
- introducing at least one dopant species of said first conductivity type into a surface of the substrate so that the substrate has a nonuniform doping profile;
- forming an epitaxial layer of said first conductivity type over said substrate;
- forming one or more body regions of a second conductivity type within said epitaxial layer;
- forming a plurality of source regions of said first conductivity type within said body regions; and
- forming a gate region adjacent to said one or more body regions.

2. A double diffused field effect transistor made in accordance with the method of claim 1 wherein the step of forming the gate region includes the steps of:

- forming a plurality of trenches within said epitaxial layer;
- forming a first insulating layer that lines said trenches; and
- forming a polysilicon conductor within said trenches and overlying the first insulating layer.

3. A double diffused field effect transistor, comprising:

- a substrate of a first conductivity type;
- at least one dopant species of said first conductivity type incorporated into a surface of the substrate so that the substrate has a nonuniform doping profile, said nonuniform doping profile having a dopant concentration that is greatest at a given depth below a surface layer of said substrate and which decreases with increasing distance away from said given depth;

an epitaxial layer of said first conductivity type located over said surface layer of said substrate;

one or more body regions of a second conductivity type disposed within said epitaxial layer;

a plurality of source regions of said first conductivity type located within said body regions; and

a gate region adjacent to said one or more body regions.

4. The double diffused field effect transistor of claim 3 wherein said gate region includes:

a plurality of trenches located within said epitaxial layer;

a first insulating layer that lines said trenches; and

a polysilicon conductor located within said trenches and overlying the first insulating layer.

5. The double diffused field effect transistor of claim 3 wherein said at least one dopant species is introduced into the substrate by ion implantation.

6. The double diffused field effect transistor of claim 3 wherein said at least one dopant species is selected from the group consisting of arsenic, antimony and phosphorous.

7. The double diffused field effect transistor of claim 3 wherein said substrate has a substantially uniform doping profile prior to introducing said at least one dopant species.

8. The double diffused field effect transistor of claim 3 further comprising an electrode layer disposed on a surface of the substrate opposite the body regions.